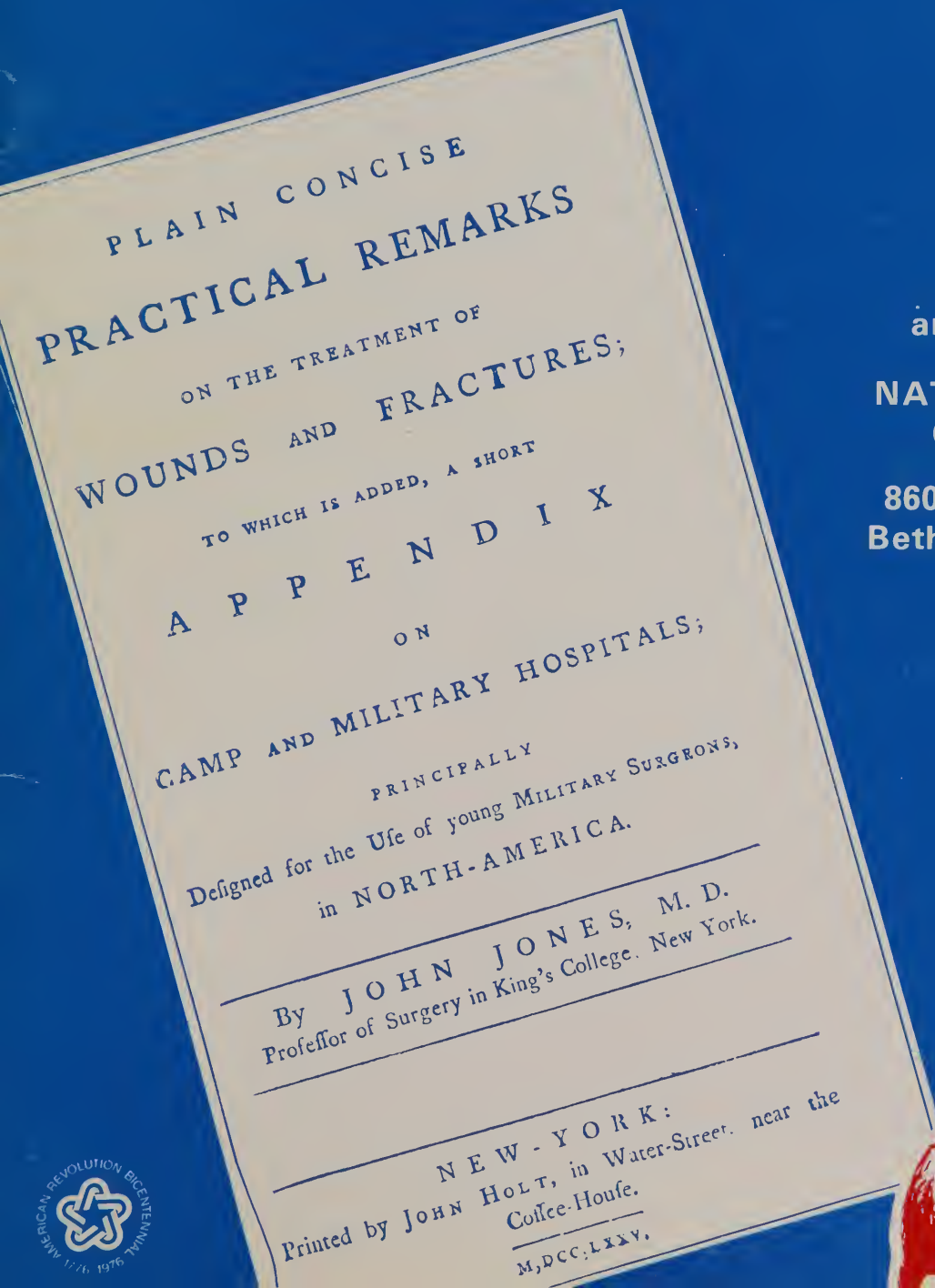


200 YEARS of American Medicine (1776 - 1976)



an exhibit at the

**NATIONAL LIBRARY
OF MEDICINE**

**8600 Rockville Pike
Bethesda, Md. 20014**



Cover:

Title page from Dr. John Jones' *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures*, 1775. This was the first full-length medical book written by an American and published in this country.

200 YEARS of American Medicine (1776 -1976)

In recognition of the nation's bicentennial, the National Library of Medicine is presenting an exhibit honoring selected American achievements in medical science and practice and outlining the development of medical education, medical literature, and public health in the United States. Themes of the exhibit are described in the following pages.

**U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health**

DHEW Publication No. (NIH) 76-1069

Head L. Sep 3 1780

Dear Sir,

I have heard that a new arrangement is about to take place in the Medical Department, and that it is likely, it will be a good deal curtailed with respect to its present appointments.

Who will be the persons generally employed I am not informed, nor do I wish to know; - nor can I wish mention to you, that I think Dr. M. B. is a man of more than serviceable abilities & experience - and that his colleagues have the strictest claim to their country's service, and to be considered the best officers in the Establishment. -

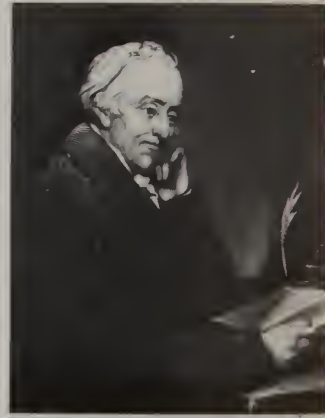
There are many other deserving characters in the Medical line of the Army, but the reason for my mentioning the above Gentlemen are, that I have the highest opinion of them - and have had intimated to me that the new arrangement might possibly be influenced by a spirit of party out of doors, which would not operate in their favour. - I wish add no more than that I am

With the most perfect resp.

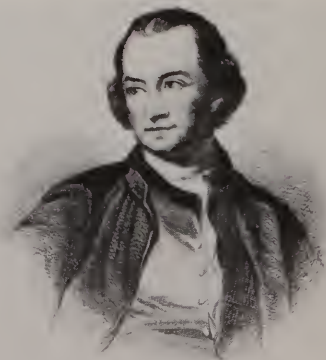
Dear Sir

Yours most Obedient
John Morgan

Physicians



Dr. M. B.



You ever affect Brother
John Morgan

and the Revolution

Many American physicians played an important role, both politically and professionally, in the winning of American independence.

A decade in advance, John Morgan expressed the feelings of many young men when in 1766 he warned against oppression of American liberties. Morgan later became Director General of the medical department of the Continental Army. Joseph Warren of Boston was a leading figure in patriotic circles that included Samuel Adams and John Hancock. He was killed at the Battle of Bunker Hill. Benjamin Rush, one of the most prominent American physicians of his day and three other physicians signed the Declaration of Independence. Immigrants, like Bodo Otto from Germany, and young men later to become leaders of the profession, like James Thacher and James

Tilton, also supported the American cause.

Regrettably, the colonies' leading physicians were often a quarrelsome lot, and the history of their service is marred by the bitter feud between Morgan and his successor William Shippen. Nevertheless, Morgan and Rush found time to issue pamphlets on military medical problems, while others issued more substantial works like John Jones on military surgery and William Brown's pharmacopoeia.

Two major European nations were also active in the fighting; our ally France and our enemy England. Both had comparatively well developed military medical services, the French under their distinguished physician-in-chief, Jean Francois Coste. British accounts suggest that their record for maintaining the health of the troops was considerably in advance of the Americans'.

On the preceding page is reproduced a letter from George Washington to "The Honorable Joseph Jones Esq. of Congress at Philadelphia." The original is in the collection of the National Library of Medicine's History of Medicine Division. The text follows.

Head Quarters Sep. 9th, 1780

Dear Sir:

I have heard that a new arrangement is about to take place in the Medical Department, and that it is likely, it will be a good deal curtailed with respect to its present appointments.

Who will be the persons generally employed I am not informed, nor do I wish to know; however I will mention

to you, that I think Doctors Craik and Cochran from their services, abilities and experience, and their close attention, have the strictest claim to their country's notice, and to be among the first officers in the establishment.

There are many other deserving characters in the medical line of the army, but the reasons for my mentioning the above gentlemen are, that I have the highest opinion of them, and have had it hinted to me that the new arrangement might possibly be influenced by a spirit of party out of doors [i.e., partisan politics], which would not operate in their favor. I will add no more than that I am

With the most perfect respect

Dear Sir

Your most obedient servant

G. Washington

Medical Education

With the achievement of political independence, Americans still had far to go to reach an equal degree of intellectual and cultural independence. Still heavily dependent on Europe, American physicians had made only slight beginnings in the development of American institutions. One of the first needs was the capability of educating physicians in our own country.

Before the Revolution, practitioners were trained chiefly by apprenticeship; a few who could afford the time and expense traveled abroad for further education. In 1765, John Morgan and William Shippen of Philadelphia, both graduates of Edinburgh, founded the first medical school in the country, now part of the University of Pennsylvania. Additional medical schools were founded at Kings College (now Columbia University) in 1768 and at Harvard in 1783. In the 19th century, however, groups of physicians throughout the country began founding small proprietary medical colleges, dividing among themselves the lectures and student fees. Entrance and graduation requirements were sufficiently low to insure a steady income. Laboratory and clinical facilities were woefully inadequate. Large numbers of poorly trained physicians were released to practice on the public.

As a result, the abler and more ambitious students continued going to Europe. Early in the 19th century Paris hospitals were the major attraction; after the Civil War, Americans flocked to Austrian and German universities, some to learn a clinical specialty, others the basic sciences. As increasing numbers returned with an awareness of good



Charles W. Eliot

teaching and above all of the possibility of transforming both teaching and practice through close association with research, scientific medicine began to evolve in this country.

Reforms were also being instituted by educational leaders from outside the medical profession. In the 1870s President Charles Eliot of Harvard introduced a graded curriculum into the medical school, lengthened the course from two to three years, elevated the entrance requirements, and substituted part-time salaries paid by the university for direct payment from student fees.

Under the educational leadership of Daniel Coit Gilman, the new Johns Hopkins University in Baltimore emphasized graduate education in research. The medical school, opening in 1893, was conceived as part of the university and closely integrated with the Johns Hopkins Hospital. In addition to upgrading undergraduate medical education, the Hopkins originated the residency training system.

Public and professional concern for medical education culminated in a survey of all the medical schools by Abraham Flexner under the auspices of the AMA Council on Medical Education and the Carnegie Foundation for the Advancement of Teaching. His report, *Medical Education in the United States and Canada* (1910), had immediate and far-reaching impact. There were then 131 medical schools in the United States, most of them proprietary. By 1920, 46 had closed or were absorbed by stronger institutions. Others were strengthened by merger, by university affiliation, and by the infusion of support from private foundations and state governments.

By the 1920s the four years of medical school were compartmentalized into two years of basic sciences taught by discipline and two years of clinical training. Since the 1950s increasing emphasis has been placed on teaching basic concepts in a program planned by interdisciplinary subject committees and tailored, in part, to the individual student's interest.

An important factor in recent changes is the growth of federal support for medical research, mostly in medical schools, from \$27 million in 1947 to \$1.4 billion in 1966. In 1968-69 approximately one third of faculty salaries were paid from federal sources. The impact of this federal support was generally favorable although some critics claim that concentration on research has diverted faculties from their primary mission of developing physicians. The present decrease in federal support, the abundance of specialists, and the shortage of primary-care physicians seem to assure continuing modifications in American medical education.



William H. Welch (1850-1934)



Abraham Flexner (1866-1959)

Medical Literature

Closely linked to the development of medical education, and equally important for the advance of medicine in this country, was the growth of suitable means for recording and disseminating new medical ideas and information.

The first purely medical publication in this country was a broadside by the Reverend Thomas Thacher, *A Brief Rule to Guide the Common People of New-England How to Order Themselves and Theirs in the Small Pocks or Measels*, Boston, 1678. Most colonial medical publications were pamphlets. Physicians who wished to publish scientific observations generally submitted them to an English journal.

The first American medical journal, *The Medical Respository*, was started in New York in 1797. In the half century following, the number gradually grew. Monographs also appeared in increasing profusion, although most of the best ones were reprints and translations of books published abroad. In 1848 the Committee on Medical Literature of the AMA, chaired by Oliver Wendell Holmes, identified twenty American medical journals. With rare exceptions, such as the *American*

Journal of the Medical Sciences, the Committee found them wanting and stressed the need for more conscientious editing and the elimination of unworthy articles and parasitical authorship. Similar criticisms were leveled at monographs.

The quality of American medical literature markedly improved with the growth of scientific medicine in the late 19th century. As physicians returned from graduate training in Austria and Germany, their reports of clinical and laboratory research upgraded existing journals and created a need for new ones devoted to the specialties. One of the earliest was the *Journal of Experimental Medicine*, established in 1896.

In the 20th century the tables turned. American texts are translated into foreign languages. The number of journals of biomedical interest has grown in 100 years from less than 50 to more than 700. Improvements in medical education, the growth of medical specialties, and the continuing expansion of basic research have placed the American medical literature in a position of primary world importance.

ENGLAND
How to order themselves and theirs in the
Small Pocks, or Measels.

The small Pox (whose nature and cure the *Adenitis* follow) is a disease in the blood, endeavouring to recover a new form and state.

3. This nature attempts . . . 1. By Separation of the pure, thrusting it out from the Veins to be separated from the impure from the Flesh
2. The first Separation is done by the Blood, leaving the

[illegible]

6. The same separation by Ebullition in a commonly deadly either by overmuch hasten
 of herce come *Placem*, in the Eaverth he is over his own vigorous operation.
 7. The same operation is dangerous excessive *Floax*, as *Discolorand*, *Calore* powder and such like
 8. The same separation is overmuch called the *Floax*, or the flowing of the
 many times have, *Chin*

...when the coming forth of the *Par*, yet they take a way that supply
...the blood is hindered, and thereupon the whole system
...no wife be heating their diet, or on the whole system
...in health.

24. "And therefore let him live no otherwise covered in his bed than he
 25. made only with warm'd water, with a Toft let him sup up the weather be temperate,
 26. neither let I would not advise at this time any medicine besides, But Let him have exercise wa-
 27. tering (or boyling of his blood) will by daye medicine besides, But Let him have exercise wa-
 28. tering (or boyling of his blood) will by daye medicine besides, But Let him have exercise wa-
 29. tering (or boyling of his blood) will by daye medicine besides, But Let him have exercise wa-
 30. tering (or boyling of his blood) will by daye medicine besides, But Let him have exercise wa-

the boiling of the blood be weak and dull that there is cause to fear it is not
separation as it is wont to be in such cases, and labour of blood, and it is not
brought low by some other sickness, or evacuation, or labour of blood, and it is not
driving.

...ing out the *Pecies* from the *Fleish*, here are must be had that the
back a new *Abullion* (or *Feaver*) boyling, and without going in
back to the separated parts, must not yet rise
from a right *Abullion* parts must not yet rise

...the heat of the blood, / or this troubles the
other hand the breaking out must not be hindered, by expelling the
degree of heat must be such as is natural agree with the
: that which exceeds or falls short is dangerous
of the sick, and their manner of life dangerous
requiring the Council's consent.

and a flux of the belly follows (for else there is no such danger)
 fed, yet moderate and not too often for fear of new *Phlegm*
 with warm milk you may hope all will so
 be cured and fall to the belly.

therefore appears by its signs, let the sick abstain from
when he desires it. For food with a Tolt for his ordi-
nary, but the coldest taken off digestion had water, but
year, and the multitudes of the sick.

21. 11. 1677.

are wont: In Summer let him rise according to custom, yet so as to be defended from heat and cold in Excess, the disease will be the sooner over-
for being kept in bed nourished the Feaverish heat
with a painful inflammation.
10. In a colder season and house
to keep his bed, let him be covered
in the winter.

20. Before the fourth day especially to youth.

From that time a gentle *Cordia* may help once given.
When the *Paffia* begin to dry and warm milk (not hot) a little d^y wth *Soc*
as four or five times daily. The *Paffia* are come to their
When the *Paffia* are come to their

the *Peplidi* are dried and fallen off, purge once and again, especially in the morning and evening, some temperate with a little *Saffron*.

thereupon leaps most troublesome dirt and anguish, and then makes

[illegible]

It the voice be gentle, the Fever mild, and after the
be large, round, sharp top'd only without an for
be cooling, at the nose. These signs are hopeful
black, bloody, green hard, all over
it there is no coming
it is easy

the Feaver above one with
the fatal or the Brith happen, when they are broke forth, if the
I these Sign are for the most part devils.

...to the Reader, not to inform the Learned Physician that
...the Patients suffer, and the Physicians also
...in pain to the Physicians and the whole Com-
...I am, &c.

A Friend, Reader to thy
Welfare,

Public Health

In the application of medical knowledge, public health organizations have played a vital role in improving the health of the nation.

Most early public health activities were conducted on a part-time basis at city, town, and village levels. However, in 1850 Lemuel Shattuck urged Massachusetts to form a state board of health to encourage and coordinate local efforts. When finally established in 1869, the Massachusetts State Board of Health became the model for other state health departments.

By mid-century also, recurring cholera and yellow fever epidemics indicated a need for coordinating sanitary measures among the states. The National Board of Health, established in 1879, was an early effort to provide the Federal Government with ongoing professional advice on these and other health matters, but its ambitions for an extensive national health role were premature. Such a role eventually fell to the

United States Public Health Service after a gradual evolution.

Under the Act for the Relief of Sick and Disabled Seamen passed in 1798, a chain of marine hospitals at inland and coastal ports gradually emerged under the loose direction of the Treasury Department. In 1871 the Department brought them under the centralized control of a Supervising Surgeon, later renamed the Surgeon General. The Marine Hospital Service thus created gradually took over quarantine administration, the control of vaccines, epidemiological investigation, and other health-related functions. By 1912 the agency's growing scope was reflected in its present name, the Public Health Service. During the 1930s the Hygienic Laboratory, an outgrowth of bacteriological studies conducted during the mid-1880s by Joseph J. Kinyoun at the Marine Hospital on Staten Island, became the National Institute of Health, located at Bethesda, Maryland.

Supplementing governmental efforts, laymen and physicians have organized to promote research, education, legislation, and improved methods. The American Public Health Association and other professional societies were established in the 1870s and later. The Pennsylvania Society for the Prevention of Tuberculosis, established in 1892, provided the model for other voluntary associations aimed at this and other specific

health problems. Similarly, wealthy individuals have supported public health through the Russell Sage, Kellogg, Milbank and other foundations. The Rockefeller Sanitary Commission carried out a far-reaching anti-hookworm campaign in the South from 1909-1914. The Rockefeller Foundation has supported sanitary work in foreign countries and financed the first American schools of public health.



UNITED STATES MARINE HOSPITAL.

PAINTED BY ANN LITTLE ATKINSON, N. H., IN 1830.

Another area of public health concern for at least 150 years has been the improvement and expansion of vital statistics. Even before the Civil War, the American Medical Association and others promoted state registration and the federal census began collecting vital statistics. Following improvements introduced by John Shaw Billings in 1880 and 1890, a permanent Census Bureau was created in 1902.

As mid-19th century statistics showed the correlation of high mortality rates with filthy conditions, the specialty of sanitary engineering emerged after the Civil War to help provide adequate sewer and water systems, and to organize urban street cleaning and garbage removal. George E. Waring, a pioneer in this field, dramatized public sanitation by putting New York's street cleaners into white uniforms, thus earning them the sobriquet of "white wings."

After 1880 bacteriology transformed public health activity. Particularly important pioneer applications were made by scientists of the Army and the Department of Agriculture and by health officials in Rhode Island, Michigan, and New York. *Scientific Bulletin No. 1* of the New York City bacteriological laboratory marked the beginning of laboratory diagnosis as a routine procedure in the control of infectious diseases.

Preventive medicine goes back to the introduction of smallpox inoculation by Cotton Mather and Zabdiel Boylston in Boston in 1721. After 1800 it was replaced by the more effective and less dangerous Jennerian vaccination. With the development of bacteriology, European discoveries such as Pasteur's rabies treatment, diphtheria antitoxin, and typhoid vaccination were quickly introduced into the United States. Thereafter, progress in immunology was



slow; by World War II it was overshadowed by new drugs, especially penicillin. The introduction of polio vaccine in the 1950s, following a massive research effort, was thus a thrilling public and scientific event. Recent decades have also seen important progress in immunization against influenza, measles, allergies, and other diseases.

Other public health specialties have also developed. Although Benjamin M'Cready had made a general survey of the health factors in different American occupations as early as 1837, Alice Hamilton still felt in 1910 that she was entering industrial medicine "as a pioneer into a new, unexplored field." Dental public health has also come of age, its most notable achievement, albeit a highly controversial one in some communities, being the fluoridation of public water supplies to reduce dental caries.



Alice Hamilton (1869-1970)



Photo of the National Institutes of Health in Bethesda, Maryland, 1949.

Scientific Contributions

Changes in medical education and the growth of medical literature formed essential institutional bases for the increasing number of contributions to knowledge by American physicians, scientists, and other health professionals and for their increasing ability to care for their patients. A few have been selected by way of illustration; many others are equally deserving.

- J. Marion Simms (1813-1883), for contributions to gynecology.
- William T. G. Morton (1819-1868), for surgical anesthesia.
- S. Weir Mitchell (1829-1914), for work in clinical neurology.
- Joseph Leidy (1823-1891), for contributions to paleontology.
- Abraham Jacobi (1830-1919), for establishing pediatrics as a specialty.
- Joseph J. Woodward (1833-1884), for contributions to microscopy and photomicrography.
- Mary Adelaide Nutting (1858-1948), for raising the standards of nursing.
- Harvey W. Wiley (1844-1930), for his campaigns against food adulteration.
- William H. Welch (1850-1934), for his major role in introducing scientific medicine to the U.S.
- John J. Abel (1857-1938), for the isolation of epinephrine and early studies in plasmapheresis.
- Theobald H. Smith (1859-1934), for demonstrating the tick transmission of Texas cattle fever.
- Walter Reed (1851-1902), for studies on yellow fever.
- Thomas Hunt Morgan (1866-1945), for the chromosome theory.
- Charles Wardell Stiles (1867-1941), for solving the problem of hookworm disease.
- Alice Hamilton (1869-1970), for work in industrial medicine.
- Walter B. Cannon (1871-1945), for studies of the autonomic nervous system.
- Eugene L. Opie (1873-1971), for contributions to the pathology of diabetes mellitus and tuberculosis.
- Florence R. Sabin (1871-1953), for research in neuroanatomy and embryology.
- Joseph Goldberger (1874-1929), for demonstrating the role of dietary deficiency in pellagra.
- Oswald T. Avery (1877-1955), for work with the transforming factor in pneumococci-DNA.

- Michael M. Davis (1879-1971), for efforts to improve health care delivery.
- Donald D. Van Slyke (1883-1971), for studies on acid-base balance and the gas and electrolyte equilibria in the blood.
- Paul R. Hawley (1891-1964) and Paul B. Magnuson (1884-1968), for improving medical care for veterans.
- Richard H. Shryock (1893-1927), for studies in the social history of medicine.
- Alfred Blalock (1899-1964), for work on shock and contributions to cardiac surgery.
- Percy L. Julian (1899-1975), for work in steroid chemistry.
- Charles R. Drew (1904-1950), for studies on blood plasma and blood preservation.
- John H. Gibbon (1904-1973), for developing the heart-lung machine.



Silas Weir Mitchell (1829-1914), shown in his clinic at the Infirmary for Nervous Disease in Philadelphia.



Mary Adelaide Nutting (1858-1948), leading figure in U.S. nursing education.



Joseph Goldberger (1874-1929), member of the U.S. Public Health Service who conducted innovative experiments in the study of pellagra.



Charles R. Drew (1904-1950), leading researcher in the study of blood plasma and blood preservation.

National Library

During the past century of outstanding progress in medicine and public health, the National Library of Medicine has continued to play an important role in making new knowledge more readily available.

The Library has descended from a small collection of books begun by Surgeon General Joseph Lovell about 1818. As the years passed, it grew slowly; in 1840 a clerk wrote the titles — about 200 altogether — in a little notebook that he titled grandly, “A catalogue of books in the library of the Surgeon General’s Office, Washington City.” The collection continued to expand at a modest pace until 1871, when the decision was made to develop it into the “National Medical Library.” This, to the Surgeon General and his staff, meant a collection that contained every medical book published in the United States, and as many as possible of all other publications relating to medicine and allied sciences. Assistant Surgeon John Shaw Billings was given the responsibility for carrying out this decision.

Billings, who had been managing the library since 1865, greatly accelerated the collecting of all medical publications. He sought new and old books, American and foreign periodicals, reports of civilian and military health organizations, dissertations, pamphlets, manuscripts, portraits and prints. He purchased from booksellers and physicians, exchanged duplicates with individuals and with other libraries, and

persuaded physicians, institutions, editors, and publishers to donate publications. Within a few years Billings had acquired practically every issue of every medical journal ever published in the United States and Canada, and 75 per cent of all medical periodicals ever published throughout the world. By 1875 the library was already more than twice as large as the next largest American medical library.

With this resource at his command, Billings conceived and established medical bibliographies of importance to physicians throughout the world. In 1879 he founded the monthly *Index Medicus*, published commercially under the editorship of his colleague Robert Fletcher. In 1880 he brought out the first volume of the *Index-Catalogue of the Library of the Surgeon-General’s Office*, a monumental work that made the Library internationally famous. For three-quarters of a century volumes continued to appear, 61 in all, until it was superseded by more rapid indexes in the 1960s.

After Billings retired in 1895, the librarian’s



John Shaw Billings (1838-1913)



Surgeon General Joseph Lovell (1788-1836)

of Medicine

chair was occupied by a succession of medical officers, among them Walter Reed. The Library building on the Mall, opened in 1887, soon became gorged with material. Within 25 years librarians were asking for more space, but wars, depressions, and priorities kept the Library in its increasingly obsolescent structure. Finally, in 1956 Congress passed a law formally establishing the Library as the National Library of Medicine, transferring it to the Public Health Service, and providing for a new building. In 1962 the Library moved from Washington to its new home adjacent to the National Institutes of Health.

Because of the great increase in medical publication starting in the late 1940s and the demands for faster bibliographic service, the Library turned to new technologies in the 1950s to speed the availability of indexes and the transmission of data to users. A partially mechanized publications system was introduced in 1960 to produce *Index Medicus*, only to be superseded four years later by a computerized system named



Library building on the mall, opened in 1887.



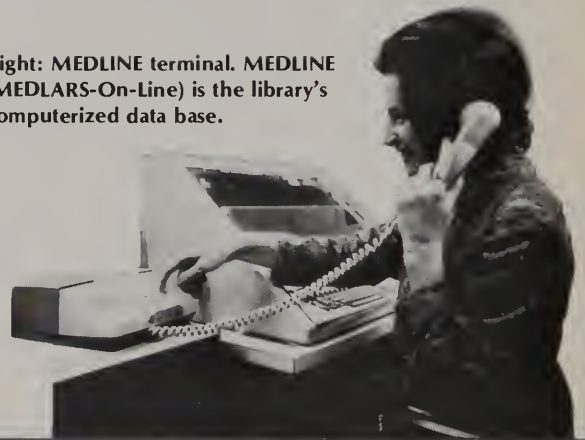
Reading room, Army Medical Library. Dr. Billings is shown seated at right (ca 1890).

MEDLARS (MEDical Literature Analysis and Retrieval System). In the 1970s, using MEDLARS and other data bases, the Library developed MEDLINE and a number of other nationwide on-line bibliographic retrieval systems. To speed service to medical researchers, educators, and practitioners, the Library provided leadership and funding for the development of a network of regional medical libraries. Congress gave the Library authority to bestow grants-in-aid and established the Lister Hill National Center for Biomedical Communications to apply advanced technology to the dissemination of medical information.

A century and a half after its birth the Library has grown from a few books on the shelf of a room in Washington to a collection of more than a million publications, the largest medical library in the world, operating one of the world's largest bibliographic information retrieval systems. Its services are known and used throughout the world.

Below: The National Library of Medicine's present building, completed in 1962.

Right: MEDLINE terminal. MEDLINE (MEDLARS-On-Line) is the library's computerized data base.



Images of the American Physician

Pictures of physicians, other than formal portraits, have tended to fall into one of two groups: the kindly “family doctor,” or the caricature.

The “family doctor” concept is usually visualized as a one-to-one relationship in a simple setting between a compassionate doctor and a worried but hopeful patient, often with family. It has been repeatedly impressed on the American consciousness by magazine art, such as that of the skillful illustrator Norman Rockwell, by advertising, and by movies.

Caricature, on the other hand, has traditionally lampooned not only medical men but also quacks and patients. In America, medical caricature has been largely confined to magazine and newspaper cartoons. Recently it has been appearing in fine prints by contemporary American artists and seems to express a growing concern with perceived depersonalization and increasing costs of medical care. As America moves into its third century, these views of sensitive observers reflect some of the serious social problems facing medicine in the years ahead.



Virgil Partch's contemplative doctor.



Children's Clinic, by Mabel Dwight

